(for example, in *Oscarula lobularis*, according to K. Heider). The difficulties presented by Trichoplax are heightened not only by our ignorance of the development, but by our lack of any facts from which to determine the physiological functions of the several layers of the body. Thanks to the kindness of Professors F. E. Schulze and Claus, I was enabled in 1883 to study Trichoplax both at Graz and Vienna, and to fully confirm the histological discoveries of the former investigator. My experiments on the manner in which the animal fed gave purely negative results, for it would take no solid food at all, thereby lending countenance to the view that Trichoplax depends on fluid nourishment alone.

Bütschli thinks the Placula theory is of more value from a physiological point of view than the other theories criticised by him. "Finally, it seems to me very important," says Bütschli (l. c., p. 416), "that the changes undergone by the assumed forms are easily comprehended, that they take place gradually, not by jumps, and are actually advantageous." "Especially in this latter respect," adds Bütschli, "is the new view about to be developed superior to its predecessors." When, however, it comes to explaining physiologically the origin of the placula, no satisfactory reasons are given why it should arise. "I regret that I am unable to adduce," Bütschli confesses himself (p. 419), "any plausible advantages to be gained by the plate on its becoming two-layered."

(To be concluded.)

THE ORIGIN OF A SMALL RACE OF TURKEYS.

BY JOHN DEAN CATON, LL.D.

THE effect upon the progeny of animals of inbreeding, or where the parents are nearly related, is a subject well worthy the attention of naturalists, though I am not aware that it has been the subject of careful study, especially among the lower forms of animal life.

With man it has undoubtedly received much attention, but even here it has been rather of a desultory character than that careful and systematic attention which its practical importance

would seem to justify. It has received attention undoubtedly from breeders of domesticated animals, but even here, so far as I am aware, are wanting long-continued experiments and careful observation. The most that can be said is that a general impression prevails among breeders that the offspring of very near relatives is seriously impaired in constitution and form. Yet instances have been cited where for one or two generations, at least, an improvement has been observed in both of these respects, and I do not remember to have seen any statement of well-authenticated observations justifying the general impression which undoubtedly prevails among the breeders of domestic animals. With the human race the fact of such deterioration resulting from the near relationship of the parents may be considered as well established, and it may be possible from this recognized fact the conclusion has been drawn that the same causes must produce the same effects among the lower orders of animals. This is a subject in which the professional breeder no less than the professional scientist should feel a deep interest, and it is to be hoped that some of these will institute careful and long-continued experiments which may throw valuable light on this subject.

A few isolated cases would be far from conclusive, yet the result of each one would have its value. These experiments should not be confined to one species alone, but should cover the entire range of domesticated animals.

In some species an actual improvement might be the result, while in others the most disastrous consequences might be observed.

With the hope of acquiring some light on this subject, some years since I disposed of all of my elk (Wapiti deer) excepting one pair, which were three years old, and when a large herd shall have been raised from this single pair we may be able to form some opinion of the effect of interbreeding upon this species of deer. The second fawn produced from this pair was a female, and she died yeaning when two years old, and since then there has not been sufficient time for the production of the inbred progeny; but even this experiment may not be entirely satisfactory, for the Wapiti deer I have found to be the most hardy and reproductive in domestication of any of the deer family.

Ten years ago I sent a number of wild turkeys from my grounds in Ottawa to Santa Cruz Island, situate in the Pacific

Ocean about twenty miles off this coast. During my stay here this winter I have formed the acquaintance of Mr. J. P. Joyaux, who at that time had charge of the island, which was used principally as a sheepwalk. It is about thirty miles long, and five to ten miles wide. There were no enemies upon the island with which the turkeys had to contend except a small gray fox, which was quite abundant. Six turkeys were received by Mr. Joyaux, two cocks and four hens. One of the cocks died soon after their arrival. They were received in the winter. The next season the four hens raised to maturity sixty-one birds, which when grown up were as large as their parents. The year following the produce was one hundred and twenty, of about the same size. I may here remark that the wild turkeys in my grounds at Ottawa, which have been hatched from eggs taken from the nest of the wild hen in the woods, have never bred till they were two years old, but some of the first generation raised in the grounds have bred when a year old, and generally the second or third generation have reproduced at a year old. Probably, therefore, not all of the hens of the first year's brood bred the next year, and this may account for the smaller relative product the second year than the first, and it is possible, and even probable, also, that Mr. Joyaux was unable to enumerate all of the second year's produce. After that they had wandered away and reverted to the wild state, so that it was impossible to form any opinion of the increase, only that they have become very abundant, and are met with in the forests far away from the ranch where the first were turned loose, and if they are not as wild as the wild turkey is observed to be in his original haunts, it may be attributed to the fact that they are not hunted with dog and gun.

In a very few years these birds bred upon the island were observed to have diminished very much in size, so that now it would be impossible to find a cock which would weigh over six pounds, which is less than one-third the size of their original ancestor or of the first and second generation bred there.

Mr. Joyaux attributes this remarkable deterioration in size to inbreeding. He says their food is abundant, consisting of small acorns, a great variety of berries, an abundance of insects, and plenty of grass. While they do not get our domesticated grains, they find plenty of seeds of grasses and herbaceous plants in their season, and plenty of water everywhere.

This is undoubtedly a case of pretty close inbreeding, the entire stock having descended from one male and four female ancestors. While I do not consider it conclusively established by any means that this deterioration in size should be attributed solely to inbreeding, it is not unlikely that this cause may have had its influence; nor am I prepared to assign any other satisfactory cause for this remarkable result. Although the native wild turkey was never found on the west side of the Colorado, while it was abundant in Arizona, not far east of that river, there would seem to be nothing in the condition of this country especially detrimental to their well-being here. The wild turkey which I have introduced in various places on the mainland north of San Francisco are reported to have done well. They are said to be prolific and healthy and to attain their normal size; and the domestic turkey, which is found all over the State, is said to do fairly well, although upon the table they are not as much admired as those raised in the Eastern States, nor are they in general as large or as fat.

No epidemic has been observed among the turkeys on Santa Cruz Island; but, on the contrary, they seem to have been always healthy and vigorous. Their habit of flight as represented to me is about the same as that observed of the Eastern wild birds in their native haunts. The flesh of these small birds is said to be good.

I have been thus particular in my account of the introduction of the wild turkey upon the island of Santa Cruz because I think it entitled to some weight at least in the investigation of the question which I have suggested.

It may be impossible to obtain facts which can throw much light upon the effects of inbreeding among wild animals in their unrestrained condition, especially those of monogamic or promiscuous habits, which is the case with most wild animals. Among quadrupeds where two are usually produced at a birth, so far as observed, the twins are usually male and female, and most probably they continue together in close intimacy till they attain a reproductive age; and here we might reasonably expect that inbreeding would very often occur, and yet there may be conditions which would disappoint this expectation, such as, for instance, the older males in the forest driving off the younger. In the case of quadrupeds where several are produced at a birth,

we might expect that inbreeding might still more frequently occur, but, after all, it is only where animals are subjected to the control of man that it is possible to make observations which can give us any satisfactory results upon this subject; so that, as before suggested, our only hope for reliable information on this subject must rest with the breeders of domestic animals. Should they take interest enough in it to make careful and numerous and long-continued experiments with the various species of animals under their control, something like certainty might be obtained where we have now nothing better than conjecture.

SANTA BARBARA, CAL., February 24, 1887.

SONNETS.

CACTUS.

(Prickly Pear.)

I KNOW an isle, clasped in the Sea's strong arms,
Sport of his rage and sharer of his dreams;
A barren spot to alien eyes it seems,
But for its own it wears unfading charms.
From Spring's first kiss to Autumn's last caress,
Gayly its moorlands bloom, from strand to strand;
And many a favored nook, by west winds fanned,
Holds flowers unmatched for tint and loveliness.
But most I mind me of a lonesome shore,
For countless gulls a harbor and freehold,
Where, like some shipwreck'd buccaneer of old,—
Cast on the sands, condemned to rove no more,—
In spiny armature, secure and bold,
The Cactus lies at length and guards its gold.

NANTUCKET, July.

NOTE.—The island of Nantucket is the northern limit of *Opuntia vulgaris.*

PARNASSIA.

(Grass of Parnassus.)

Oh, stately, calm, and pure, as best beseems
One born in that far land of sun and song,
Beloved of gods and men, whose vales along